

Use of Geographic Information Systems (GIS) to
Evaluate Marsh Management Techniques

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Dense stands of cattails (*Typha* spp.) with standing water provide roost sites for large aggregations of migrating blackbirds (Icterinae). Sunflower fields surrounding wetlands were frequently depredated, resulting in millions of dollars in lost revenue. Cattail-choked marshes were treated with glyphosate based ^{*}RODEO herbicide (Monsanto, St. Louis, MO) to reduce available roosting sites to disperse blackbirds.

Aerial color infrared 35 mm slides were taken of treated and control marshes to facilitate evaluation of herbicide efficacy. Color infrared film was chosen because of its sensitivity to subtle differences in reflected energy from different plant species at different growth stages. The color infrared slides were taken through a belly-hole of a fixed-wing aircraft at 1,829 m elevation during early August, which is the peak growing period for cattails in North Dakota. Slides were scanned into a computer data base, converted to raster based images, and analyzed using a GIS (MIPS, MicroImages, Inc., Lincoln, NE).

The feature mapping process of MIPS was used to develop 13 classes ranging from bare soil to the most vigorous growth phase of cattails. The overall area of the marsh, the amount of area covered by each feature, the average feature size, the number of cells of each feature, and the boundary of each feature were calculated. Data output from MIPS was compared on a year-to-year basis to determine the recolonization of cattails and other marsh vegetation. The feature map data were also correlated with avian census data to determine how herbicide treatment of marshes effects different groups of birds throughout the year.

GIS can be used to identify and quantify the habitat characteristics of wetlands throughout the Prairie Pothole Region in relation to sunflower production patterns and blackbird populations. These data will allow managers to develop a safe and cost-effective integrated pest management plan for blackbird damage to sunflowers on an ecosystem-wide basis.